The minimum discharge of Logan River from 1923–24 to 1929–30, inclusive, occurred in 1926. This was year of minimum precipitation above 8,000 feet elevation; it was also a year of above-normal valley precipitation. The maximum discharge occurred in 1927, which was a year of maximum precipitation both in the valley and on the mountains. The average annual discharge of Logan River is 221,645 acre-feet, or a uniform depth over the watershed of 19 inches. This is more by 2.5 inches than the annual precipitation at Logan, a valley station. On many Utah watersheds the run-off depth is greater than the valley precipitation on these watersheds.

Year	Period	Precip. at Logan Elev 4780	Mountain Precip Above 8000 Feet Elevation	Valley Precip. in Percentage of Mountain Precip.
1923-24	Nov 1-Apr 6	4.69	27.6	17.0
1924-25	Nov 1-Apr 6	7.79	31.9	24.4
1925-26	Nov 1-Apr 8	8.42	20.7	40.6
1926-27	Nov 1-Apr 6	9.53	39.3	24.2
1927-28	Nov 1-Apr 5	6.23	32.7	19.4
1928-29	Nov 1-Apr 3	6.79	34.2	20.2
1929-30	Nov 1-Apr 1	6.54	28.1	23.2

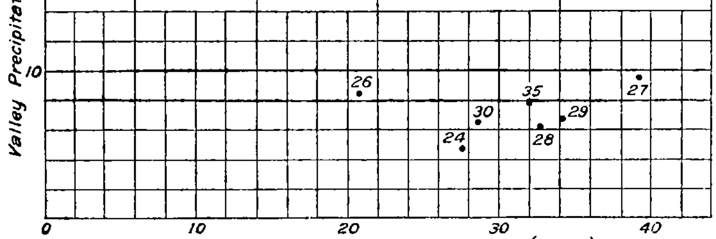

FIGURE 2

The record cited in Figure 2 shows little, if any, relationship between valley and mountain precipitation in northern Utah. This means that precipitation occurring in the valley is a poor index of the precipitation on the high watersheds or of the water-supply to be derived therefrom.

Figure 3 shows the winter valley precipitation and the winter mountain precipitation plotted against the run-off for April to September, inclusive. These curves show a poor relationship between valley precipitation and run-off. The relationship between winter mountain precipitation and run-off is much closer. Although the available record of winter precipitation on high watersheds is short, the winter precipitation as measured by annual snow surveys apparently is a good index of the water supply to be expected from such watersheds.

SUMMARY

1. Precipitation on the valley floor of Cache Valley varies widely, increasing with elevation from the bottom of the valley floor to the foothills.
2. The average spring and summer precipitation for the 18 valley stations equaled approximately 45 per cent of the total annual precipitation.
3. The summer precipitation at the valley stations is spotted, while the winter precipitation is more uniform.
4. Summer precipitation above 8,000 feet is extremely spotted.

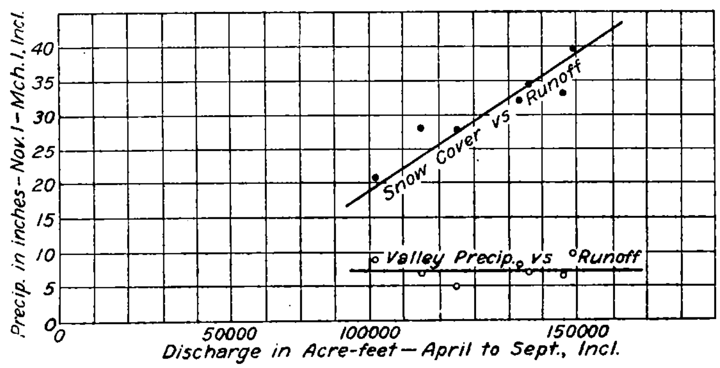

FIGURE 3

5. There seems to be no fixed relationship between the valley and mountain precipitation during the summer season.
6. Winter precipitation on high mountain watersheds is measured by snow surveys. It is quite uniform over wide areas.
7. The water equivalent of the accumulated snow cover on high watersheds is several times the valley precipitation during the period of accumulation.
8. Existing records indicate that during the winter season for northern Utah watersheds there is no relationship between valley and mountain precipitation.
9. Valley precipitation is a poor index of the probable water supplies and at times may be misleading.
10. Mountain precipitation measured above 8,000 feet elevation seems to be a good index of stream flow from that area.

THE GREEN FLASH OBSERVED OCTOBER 16, 1929, AT LITTLE AMERICA BY MEMBERS OF THE BYRD ANTARCTIC EXPEDITION

By WILLIAM C. HAINES

[Weather Bureau, Washington, D. C.]

On the evening of October 16, 1929, between 8:45 p. m. and 9:20 p. m. (180 meridian time), several members of the expedition observed a very striking example of the green flash. At the time the sun was skirting the southern horizon, its disk disappearing at intervals only to reappear again a few moments later. This fluctuation was caused by the unevenness of the barrier surface which formed the line of the horizon. The irregularities in the snow surface permitted the upper limb of the sun to appear in one or more starlike points of light from adjacent notches. These points or flares of light would sometimes have a greenish color on their appearance or disappearance. The length of time during which the green flare was visible varied from a fraction of a second to several seconds, and at times it was possible to keep it in view or to make it reappear again by raising or lowering the head. Occasionally green, orange, and red flares could be seen simultaneously at different points, giving one the impression of traffic lights. When the sun sank too low to be seen from the ground, it was still visible from elevated points such as the anemometer post or radio towers. The above effect was seen at intervals during a period lasting over half an hour.

At the time of occurrence of the phenomenon the sky was seven-tenths covered with clouds, the clear portion being along the southern horizon. A few patches of alto-stratus clouds in the vicinity of the sun showed sunset colors. There was a light southerly wind (8 miles an hour) and the temperature was $-24°$ F. at the time. Between the sun and the camp lay a depression in the barrier within which the air was often much colder and less disturbed than over the surounding area. Conditions seemed favorable for marked refraction, as a very shallow layer of surface air from the south underran a northerly wind all evening, which condition should have caused a marked temperature inversion.

The phenomenon was first observed by Mr. M. P. Hanson, the radio engineer, who came in and told me to go out and look at the sun, saying, "it is green." When I reached the outside it continued green. It had exactly the same appearance as an example of the green flash witnessed by the writer and others in April, 1926, between Norway and Spitzbergen, while on the Byrd Arctic Expedition, except in this case the flash lasted only for a fraction of a second.

Conditions were more favorable for its occurrence when first observed. Later the green appeared for shorter and less frequent intervals, and the orange and red flares increased in frequency.

Numerous times while on the barrier the writer looked for the green flash under quite similar conditions but failed to observe it. This fact would seem to indicate that a favorable condition of the air is necessary for its occurrence at a time when a very small part of the sun's disk is visible.

Among other members of the expedition who observed the phenomenon were Dr. Dana Coman, physician, Mr. Frank T. Davis, physicist; and Mr. Henry T. Harrison, meteorologist.

A FIELD ALBEDOMETER

By Prof. N. N. KALITIN

[L'Observatoire Géophysique Central, Leningrad, U. S. S. R., January 15, 1931]

Measurements of the albedo of the many varieties of earth surface are of interest in numerous lines of research, e. g., to meteorology, in obtaining true values of the gain and loss of radiant energy; to plant physiology, etc.

Systematic measurements of the albedo of various crops, taken at different stages of their development, have a special value for agronomical researches. For this last purpose it is necessary to have a portable apparatus allowing easy, rapid, and uninterrupted measurements.

The A. Ångström pyranometer is a very convenient apparatus for measurements of the albedo, being light and compact, but its installation proves most unhandy. The apparatus has to be fixed and leveled on a solid support (a tripod), at the end of a small rod which places it above the area to be investigated. This rod is so short that the pyranometer can be adjusted only over the edge of the area examined, e. g., field of crops. The readings of the apparatus may also be influenced by the support, and the transportation and installation of the tripod prove inconvenient and take much time. In order to eliminate these drawbacks a field albedometer, requiring neither support nor leveling, has been constructed by the author.

The design of this pyranometer is based on the adaptation of a Cardan's suspension which automatically brings the apparatus to a horizontal position. The construction of the pyranometer is as follows: In Figure 1 the receiving parts consist of 6 thin copper bands, 3 of which are coated with magnesium oxide,[1] and 3 with soot. On the back of the bands is attached a battery of 18 copper-constantan thermocouples.

The pyrheliometer is protected by a thin spherical glass cover. The casing of the pyranometer is supported from its upper part on two diametrically opposite pivots and fastened to a ring in such a manner as to allow it to rotate freely around both pivots. In turn this ring can rotate around two diametrically opposite pivots, disposed at right angles to the first two and fastened to the ends of a half ring soldered in the middle to a tube which may be put on a rod. In other words, the casing of the pyranometer is adjusted on a Cardan's suspension. The bottom of the casing being supplied with a lead weight, the receiving bands of the pyranometer are always disposed horizontally.

For the measurements of the albedo it is necessary to make the second series of readings with the receiving surfaces turned downward toward the surface to be investigated. It is sufficient, for this purpose, to turn the apparatus 180° around an imaginary axis passing through the rod. The casing of the pyranometer will be reversed, with the receiving surfaces directed downward and, having slipped 5 centimeters down along two guides (seen in the photograph), will assume a steadfast position, with receiving surfaces disposed horizontally. (See fig. 2.)

It is evident in both cases that the adjustment of the pyranometer is rapid and automatic. During observations the pyranometer is attached to a bamboo rod 3 meters long and connected by means of conductors with a galvanometer; the loop of the Zeiss galvanometer seems the most suitable in this case, being well adapted to field work. Two men, one operating the albedometer and the other taking the readings, can accomplish a very extensive piece of work during a day.

Figure 3 shows field work carried on by means of the albedometer. This apparatus also proves very convenient for measuring the albedo of water surfaces, when it is especially difficult to level the receiving surfaces.

[1] The method given by A. Ångström.

OBSERVING THE WEATHER AT MOUNT EVANS, GREENLAND

By LEONARD R. SCHNEIDER

For a person who had lived all his life in Illinois, in the heart of the Corn Belt, the weather of Greenland presented many unusual features. It will be a few of these features, arranged in a time sequence, which I wish to describe in the following.

As an introductory paragraph, it may be pointed out that two things account for the unusually large number of fair-weather days at Mount Evans. Undoubtedly the height and length of the great Sukkertoppen iceblink lying nearly 100 miles south of us was sufficient to interfere with and perhaps ward off frequent winds and storms that might otherwise come from that direction. But far more effective in the matter of bringing clear skies was the fact that the region was subject to the drying down-slope winds which prevail from off the ice cap. Being inland some 80 miles removed us from much of the wind that makes good use of the Davis Strait-Baffin Bay highway. But the camp's other dominant feature was the practically unlimited visibility, which a mountain-top position gave us.

Our first impression of Greenland weather lived up to the mental impression always created by the word "Greenland." On July 11, only two days after our arrival at Mount Evans, more than an inch of snow fell.